

### Task

To connect up an electric circuit including a filament lamp and familiarize yourself with the function of each of the individual components, and how they act together.

### Equipment

Plug-in board	06033.00	1
On/off switch	39139.00	1
Wire building block	39120.00	3
Lamp holder E10	17049.00	1
Battery holder	39115.01	1
Connecting cable, 25 cm, red	07313.01	1
Round-cell battery, 1.5 V, R14	07922.01	1
Filament lamp, 4V/0.04 A, E10, 1 pc.	06154.03	(1)

### Set-Up and Procedure

- Acquaint yourself with the individual components:
  - **Plug-in board:** This holds a system of sockets which are connected together with wire as shown by the lines on the upper side of the plate. These sockets accept the plug pins of components in experiments.
  - **On/off switch:** This enables the circuit to be made (closed) or broken (opened).
  - **Lamp holder:** The filament lamp is to be screwed into this.
  - **Connecting cable:** This consists of a wire which is covered with an insulating layer to protect it from being touched.
  - **Wire building block:** This consists of a short wire between plugs, and allows the sockets of the plug-in board to be conveniently connected to each other, without the need for connecting cable.
  - **Battery:** You will no doubt know what this is. It is the source of the electric current which is to flow in the circuit (you will understand later why it is called the voltage source).

- Connect up the circuit as shown in Fig. 1; with the switch initially open (the individual components are depicted as symbols in Fig. 1. The numbers 1 to 3 show the positions where wire building blocks are to be plugged in).
- Close and open the switch several times, observing the filament lamp while doing this; note what you observe under (1).
- Replace one of the wire building blocks with the connecting cable and again operate the switch; observe the filament lamp.
- Exchange the positions of the switch and the filament lamp, then switch on and off; now re-plug the battery holder to turn round the poles of the battery and again switch on and off; in each case observe the lamp to see if there is a change in its brightness; note your observations under (2).

### Observations

(1)

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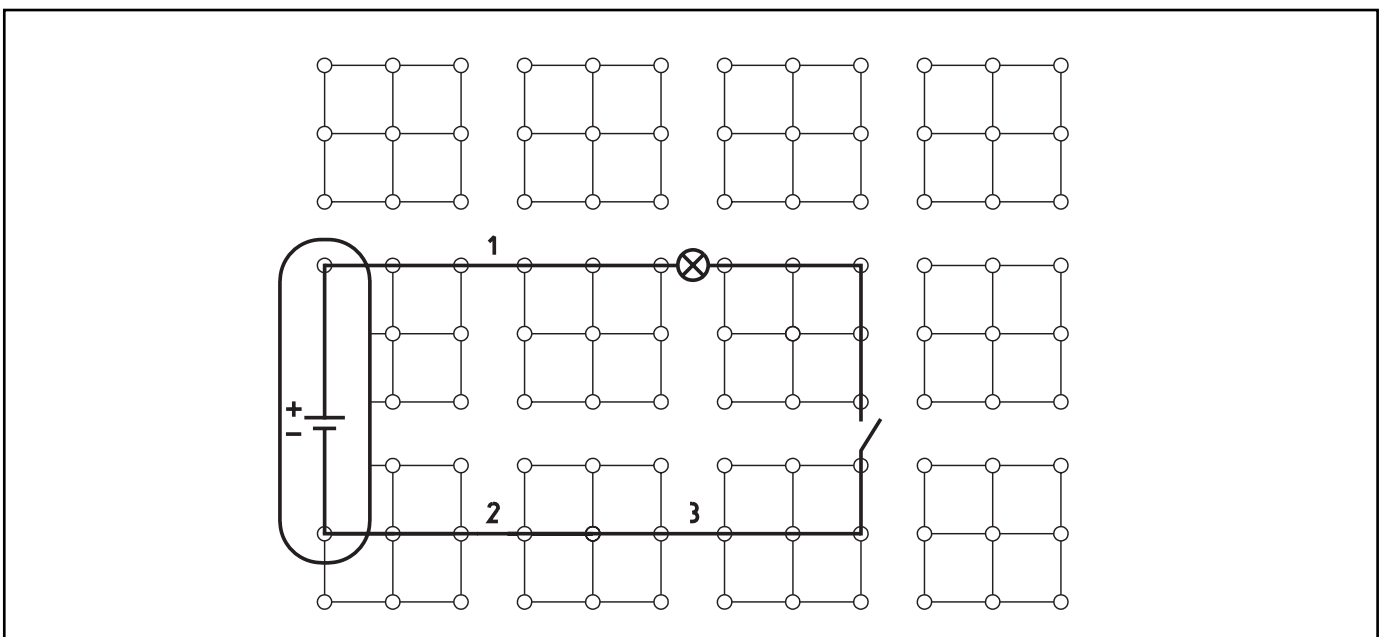
(2)

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Fig. 1



**Evaluation**

1. What do you conclude from the observations you have noted under (1) and (2)?

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2. Which components belong to a simple electric circuit? (Use the term “connecting cable” for “wire building block” and the general term “electrical appliance” for “filament lamp”.)

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3. What is the function of the switch in a circuit?

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4. How could you recognize in this experiment that an electric current flowed?

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5. Each battery has two poles; a positive pole and a negative pole. Take a good look at the battery and describe which one is the positive pole and which the negative pole.

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6. The electrical components used are represented as symbols in the circuit diagram in Fig. 1. Enter the symbols used in the following Table.

7. Draw a circuit diagram of the circuit you have used in Fig. 2, with battery, filament lamp and open switch.

Table

Component	Connecting cable	Battery (with poles)	Switch	Filament lamp
Symbol				

Fig. 2



(What does a simple circuit consist of?)

The students should first perceive that an electric current can only flow in a closed circuit. To achieve this, the simplest possible circuit is used, in which there is neither a series nor a parallel connection of electrical appliances, and which is therefore called a simple circuit.

They should also memorize which components or elements were used, their functions and the symbols used to represent them, so that right from the start of the lessons on electricity they become capable of setting up circuits according to circuit diagrams, and of depicting experimental set-ups as circuit diagrams.

### Notes on Set-Up and Procedure

We recommend that, after the students have set up the circuit according to Fig. 1, you explain the principle course of the electric current, as the conducting connections marked on the plug-in board allow various possibilities, of which the simplest one is finally given preference in the circuit diagram (see Evaluation 6).

### Observations

- (1) The filament lamp only lights up when the switch is closed.
- (2) There is no change in the brightness of the lamp when the switch is closed. It is only a question of whether the switch is closed or not.

### Evaluation

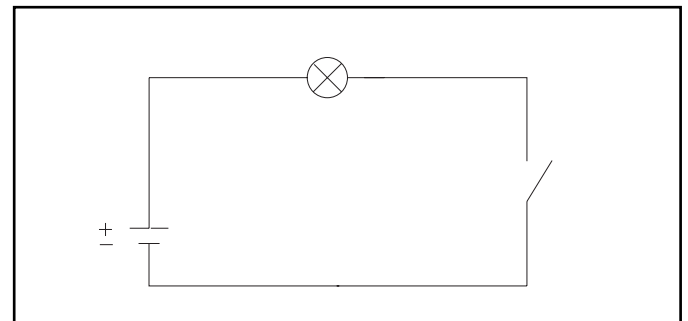
1. Current only flows in a simple circuit when the circuit is closed. The succession of the components and the polarity of the battery have no effect on this.

2. The following components belong to a simple electric circuit; a battery, connecting cables, an electrical appliance (e.g. a filament lamp) and a switch.
3. The function of the switch is to make (close) or break (open) the circuit.
4. The glowing of the filament lamp showed when an electric current flowed.
5. The metal cap which protrudes out of the battery is the positive pole (terminal). This is also shown by the + symbol printed on this end of the battery. The flat bottom of the battery is the negative pole.
- 6.

Table

Component	Connecting cable	Battery (with poles)	Switch	Filament lamp
Symbol	—			

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Fig. 2



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## **A simple circuit**



(What does a simple circuit consist of?)

Room for notes